

## SEQUENCE LISTING

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 Hjort, Carsten

<120> Starch Process

<130> 10473.204-US

<160> 22

<170> PatentIn version 3.3

<210> 1

<211> 102

<212> PRT

<213> Bacillus flavothermus

<400> 1

Ile Ser Thr Thr Ser Gln Ile Thr Phe Thr Val Asn Asn Ala Thr Thr  
 1 5 10 15

Val Trp Gly Gln Asn Val Tyr Val Val Gly Asn Ile Ser Gln Leu Gly  
 20 25 30

Asn Trp Asp Pro Val His Ala Val Gln Met Thr Pro Ser Ser Tyr Pro  
 35 40 45

Thr Trp Thr Val Thr Ile Pro Leu Leu Gln Gly Gln Asn Ile Gln Phe  
 50 55 60

Lys Phe Ile Lys Lys Asp Ser Ala Gly Asn Val Ile Trp Glu Asp Ile  
 65 70 75 80

Ser Asn Arg Thr Tyr Thr Val Pro Thr Ala Ala Ser Gly Ala Tyr Thr  
 85 90 95

Ala Ser Trp Asn Val Pro  
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<210> 2

<211> 99

<212> PRT

<213> Bacillus sp.

<400> 2

Thr Ser Asn Val Thr Phe Thr Val Asn Asn Ala Thr Thr Val Tyr Gly  
 1 5 10 15

Gln Asn Val Tyr Val Val Gly Asn Ile Pro Glu Leu Gly Asn Trp Asn  
 20 25 30

Ile Ala Asn Ala Ile Gln Met Thr Pro Ser Ser Tyr Pro Thr Trp Lys  
 35 40 45

Thr Thr Val Ser Leu Pro Gln Gly Lys Ala Ile Glu Phe Lys Phe Ile  
 50 55 60

Lys Lys Asp Ser Ala Gly Asn Val Ile Trp Glu Asn Ile Ala Asn Arg  
 65 70 75 80

Thr Tyr Thr Val Pro Phe Ser Ser Thr Gly Ser Tyr Thr Ala Asn Trp  
 85 90 95

Asn Val Pro

<210> 3  
 <211> 102  
 <212> PRT  
 <213> Alcaliphilic Bacillus

<400> 3

Thr Ser Thr Thr Ser Gln Ile Thr Phe Thr Val Asn Asn Ala Thr Thr  
 1 5 10 15

Val Trp Gly Gln Asn Val Tyr Val Val Gly Asn Ile Ser Gln Leu Gly  
 20 25 30

Asn Trp Asp Pro Val Asn Ala Val Gln Met Thr Pro Ser Ser Tyr Pro  
 35 40 45

Thr Trp Val Val Thr Val Pro Leu Pro Gln Ser Gln Asn Ile Gln Phe  
 50 55 60

Lys Phe Ile Lys Lys Asp Gly Ser Gly Asn Val Ile Trp Glu Asn Ile  
 65 70 75 80

Ser Asn Arg Thr Tyr Thr Val Pro Thr Ala Ala Ser Gly Ala Tyr Thr  
 85 90 95

Ala Asn Trp Asn Val Pro  
100

<210> 4  
<211> 484  
<212> PRT  
<213> Bacillus flavothermus

<400> 4

Gly Ser Val Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Tyr  
1 5 10 15

Leu Pro Asp Asp Gly Thr Leu Trp Thr Lys Val Ala Asn Asn Ala Gln  
20 25 30

Ser Leu Ala Asn Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr  
35 40 45

Lys Gly Thr Ser Ser Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr  
50 55 60

Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly  
65 70 75 80

Thr Lys Thr Gln Tyr Ile Gln Ala Ile Gln Ala Ala His Thr Ala Gly  
85 90 95

Met Gln Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala Asp  
100 105 110

Gly Thr Glu Leu Val Asp Ala Val Glu Val Asn Pro Ser Asp Arg Asn  
115 120 125

Gln Glu Ile Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe Asp  
130 135 140

Phe Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp Tyr  
145 150 155 160

His Phe Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile  
165 170 175

Tyr Lys Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp Thr  
180 185 190

Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Leu Asp Met Asp  
195 200 205

His Pro Glu Val Val Ser Glu Leu Lys Asn Trp Gly Lys Trp Tyr Val  
210 215 220

Thr Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile  
225 230 235 240

Lys Tyr Ser Phe Phe Pro Asp Trp Leu Ser Tyr Val Arg Thr Gln Thr  
245 250 255

Gln Lys Pro Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Ile Ser  
260 265 270

Lys Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Ser Met Ser Leu Phe  
275 280 285

Asp Ala Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Gly Gly  
290 295 300

Tyr Phe Asp Met Arg Thr Leu Leu Asn Asn Thr Leu Met Lys Asp Gln  
305 310 315 320

Pro Thr Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Glu Pro Gly  
325 330 335

Gln Ser Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala Tyr  
340 345 350

Ala Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr Gly  
355 360 365

Asp Tyr Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Ala Leu Lys Ser Lys  
370 375 380

Leu Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln  
385 390 395 400

His Asp Tyr Ile Asp Ser Ala Asp Ile Ile Gly Trp Thr Arg Glu Gly

405

410

415

Val Ala Glu Lys Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly  
 420 425 430

Pro Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Gln His Ala Gly Lys  
 435 440 445

Thr Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn  
 450 455 460

Ala Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Ile  
 465 470 475 480

Trp Val Pro Lys

<210> 5  
 <211> 485  
 <212> PRT  
 <213> Bacillus sp

<400> 5

Ala Asn Thr Ala Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp  
 1 5 10 15

Asp Leu Pro Asn Asp Gly Thr Leu Trp Thr Lys Val Lys Asn Glu Ala  
 20 25 30

Ser Ser Leu Ser Ala Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala  
 35 40 45

Tyr Lys Gly Thr Ser Gln Ala Asp Val Gly Tyr Gly Val Tyr Asp Leu  
 50 55 60

Tyr Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Ile Arg Thr Lys Tyr  
 65 70 75 80

Gly Thr Lys Thr Gln Tyr Leu Gln Ala Ile Gln Ala Ala Lys Ser Ala  
 85 90 95

Gly Met Gln Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala  
 100 105 110

Asp Ser Thr Glu Trp Val Asp Ala Val Glu Val Asn Pro Ser Asn Arg  
115 120 125

Asn Gln Glu Thr Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe  
130 135 140

Asp Phe Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp  
145 150 155 160

Tyr His Phe Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg  
165 170 175

Ile Tyr Lys Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp  
180 185 190

Thr Glu Asn Gly Asn Tyr Asp Tyr Leu Met Phe Ala Asp Leu Asp Met  
195 200 205

Asp His Pro Glu Val Val Ala Glu Leu Lys Asn Trp Gly Lys Trp Tyr  
210 215 220

Val Asn Thr Thr Asn Val Asp Gly Phe Arg Leu Asp Ala Val Lys His  
225 230 235 240

Ile Lys Tyr Ser Phe Phe Pro Asp Trp Leu Ser Tyr Val Arg Asn Gln  
245 250 255

Thr Gly Lys Asn Leu Phe Ala Val Gly Glu Phe Trp Gly Tyr Asp Val  
260 265 270

Asn Lys Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Ala Met Ser Leu  
275 280 285

Phe Asp Ala Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Ser  
290 295 300

Gly Tyr Phe Asp Met Arg Tyr Leu Leu Asn Asn Thr Leu Met Lys Asp  
305 310 315 320

Gln Pro Ala Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Gln Pro  
325 330 335

Gly Gln Ser Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala  
 340 345 350

Tyr Ala Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr  
 355 360 365

Gly Asp Tyr Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Gly Leu Lys Ser  
 370 375 380

Lys Ile Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr  
 385 390 395 400

Gln Arg Asp Tyr Ile Asp His Gln Asp Ile Ile Gly Trp Thr Arg Glu  
 405 410 415

Gly Ile Asp Ala Lys Pro Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp  
 420 425 430

Gly Pro Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Arg His Ala Gly  
 435 440 445

Lys Val Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile  
 450 455 460

Asn Ala Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser  
 465 470 475 480

Ile Trp Val Ala Lys  
 485

<210> 6  
 <211> 484  
 <212> PRT  
 <213> Alkaliphilic bacillus

<400> 6

Gly Ser Val Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Tyr  
 1 5 10 15

Leu Pro Asp Asp Gly Thr Leu Trp Thr Lys Val Ala Asn Asn Ala Gln  
 20 25 30

Ser Leu Ala Asn Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr  
 35 40 45

Lys Gly Thr Ser Ser Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr  
 50 55 60

Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly  
 65 70 75 80

Thr Lys Thr Gln Tyr Ile Gln Ala Ile Gln Ala Ala His Thr Ala Gly  
 85 90 95

Met Gln Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala Asp  
 100 105 110

Gly Thr Glu Leu Val Asp Ala Val Glu Val Asn Pro Ser Asp Arg Asn  
 115 120 125

Gln Glu Ile Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe Asp  
 130 135 140

Phe Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp Tyr  
 145 150 155 160

His Phe Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile  
 165 170 175

Tyr Lys Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp Thr  
 180 185 190

Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Leu Asp Met Asp  
 195 200 205

His Pro Glu Val Val Ser Glu Leu Lys Asn Trp Gly Lys Trp Tyr Val  
 210 215 220

Ile Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile  
 225 230 235 240

Lys Tyr Ser Phe Phe Pro Asp Trp Leu Ser Tyr Leu Arg Thr Gln Thr  
 245 250 255

Gln Lys Pro Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Ile Asn  
 260 265 270



Lys Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Ser Met Ser Leu Phe  
 275 280 285

Asp Ala Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Gly Gly  
 290 295 300

Tyr Phe Asp Met Arg Thr Leu Leu Asn Asn Thr Leu Met Lys Glu Gln  
 305 310 315 320

Pro Thr Leu Ser Val Thr Leu Val Asp Asn His Asp Thr Glu Pro Gly  
 325 330 335

Gln Ser Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala Tyr  
 340 345 350

Ala Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr Gly  
 355 360 365

Asp Tyr Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Ala Leu Lys Ser Lys  
 370 375 380

Leu Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln  
 385 390 395 400

His Asp Tyr Ile Asp Asn Ala Asp Ile Ile Gly Trp Thr Arg Glu Gly  
 405 410 415

Val Ala Glu Lys Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly  
 420 425 430

Pro Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Gln His Ala Gly Lys  
 435 440 445

Thr Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn  
 450 455 460

Ala Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Ile  
 465 470 475 480

Trp Val Pro Lys

<210> 7  
 <211> 517  
 <212> PRT  
 <213> Bacillus sp.:

<400> 7

Met Ser Leu Phe Lys Lys Ile Phe Pro Trp Ile Leu Ser Leu Leu Leu  
 1 5 10 15

Leu Phe Leu Phe Ile Ala Pro Phe Ser Ile Gln Thr Glu Lys Val Arg  
 20 25 30

Ala Gly Ser Val Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp  
 35 40 45

Tyr Leu Pro Asp Asp Gly Thr Leu Trp Thr Lys Val Ala Asn Asn Ala  
 50 55 60

Gln Ser Leu Ala Asn Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala  
 65 70 75 80

Tyr Lys Gly Thr Ser Ser Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu  
 85 90 95

Tyr Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr  
 100 105 110

Gly Thr Lys Thr Gln Tyr Ile Gln Ala Ile Gln Ala Ala His Thr Ala  
 115 120 125

Gly Met Gln Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala  
 130 135 140

Asp Gly Thr Glu Leu Val Asp Ala Val Glu Val Asn Pro Ser Asp Arg  
 145 150 155 160

Asn Gln Glu Ile Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe  
 165 170 175

Asp Phe Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp  
 180 185 190

Tyr His Phe Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg  
 195 200 205

Ile Tyr Lys Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp  
 210 215 220

Thr Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Leu Asp Met  
 225 230 235 240

Asp His Pro Glu Val Val Ser Glu Leu Lys Asn Trp Gly Lys Trp Tyr  
 245 250 255

Val Thr Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His  
 260 265 270

Ile Lys Tyr Ser Phe Phe Pro Asp Trp Leu Ser Tyr Val Arg Thr Gln  
 275 280 285

Thr Gln Lys Pro Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Ile  
 290 295 300

Ser Lys Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Ser Met Ser Leu  
 305 310 315 320

Phe Asp Ala Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Gly  
 325 330 335

Gly Tyr Phe Asp Met Arg Thr Leu Leu Asn Asn Thr Leu Met Lys Asp  
 340 345 350

Gln Pro Thr Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Glu Pro  
 355 360 365

Gly Gln Ser Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala  
 370 375 380

Tyr Ala Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr  
 385 390 395 400

Gly Asp Tyr Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Ala Leu Lys Ser  
 405 410 415

Lys Leu Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr  
 420 425 430

Gln His Asp Tyr Ile Asp Ser Ala Asp Ile Ile Gly Trp Thr Arg Glu  
 435 440 445

Gly Val Ala Glu Lys Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp  
 450 455 460

Gly Pro Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Gln His Ala Gly  
 465 470 475 480

Lys Thr Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile  
 485 490 495

Asn Ala Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser  
 500 505 510

Ile Trp Val Pro Lys  
 515

<210> 8  
 <211> 550  
 <212> PRT  
 <213> Unknown

<220>  
 <223> Source unknown

<400> 8

Met Ser Leu Phe Lys Lys Ile Phe Pro Trp Ile Val Ser Leu Leu Leu  
 1 5 10 15

Leu Phe Ser Phe Ile Ala Pro Phe Ser Ile Gln Thr Glu Lys Val Arg  
 20 25 30

Ala Gly Ser Val Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp  
 35 40 45

Tyr Leu Pro Asp Asp Gly Thr Leu Trp Thr Lys Val Ala Asn Asn Ala  
 50 55 60

Gln Ser Leu Ala Asn Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala  
 65 70 75 80

Tyr Lys Gly Thr Ser Ser Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu  
 85 90 95

Tyr Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr  
100 105 110

Gly Thr Lys Thr Gln Tyr Ile Gln Ala Ile Gln Ala Ala His Thr Ala  
115 120 125

Gly Met Gln Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala  
130 135 140

Asp Gly Thr Glu Leu Val Asp Ala Val Glu Val Asn Pro Ser Asp Arg  
145 150 155 160

Asn Gln Glu Ile Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe  
165 170 175

Asp Phe Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp  
180 185 190

Tyr His Phe Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg  
195 200 205

Ile Tyr Lys Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp  
210 215 220

Thr Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Leu Asp Met  
225 230 235 240

Asp His Pro Glu Val Val Ser Glu Leu Lys Asn Trp Gly Lys Trp Tyr  
245 250 255

Val Thr Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His  
260 265 270

Ile Lys Tyr Ser Phe Phe Pro Asp Trp Leu Ser Tyr Val Arg Thr Gln  
275 280 285

Thr Gln Lys Pro Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Ile  
290 295 300

Asn Lys Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Ser Met Ser Leu  
305 310 315 320

Phe Asp Ala Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Gly  
 325 330 335

Gly Tyr Phe Asp Met Arg Thr Leu Leu Asn Asn Thr Leu Met Lys Asp  
 340 345 350

Gln Pro Thr Leu Ser Val Thr Leu Val Asp Asn His Asp Thr Glu Pro  
 355 360 365

Gly Gln Ser Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala  
 370 375 380

Tyr Ala Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Ile Phe Tyr  
 385 390 395 400

Gly Asp Tyr Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Ala Leu Lys Ser  
 405 410 415

Lys Leu Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr  
 420 425 430

Gln His Asp Tyr Ile Asp Asn Ala Asp Ile Ile Gly Trp Thr Arg Glu  
 435 440 445

Gly Val Ala Glu Lys Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp  
 450 455 460

Gly Pro Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Gln His Ala Gly  
 465 470 475 480

Lys Thr Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile  
 485 490 495

Asn Ala Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser  
 500 505 510

Ile Trp Val Pro Lys Thr Ser Thr Thr Ser Gln Ile Thr Phe Thr Val  
 515 520 525

Asn Asn Ala Thr Thr Val Trp Gly Gln Asn Val Tyr Val Val Gly Asn  
 530 535 540

Ile Ser Gln Leu Gly Asn  
545 550

<210> 9  
<211> 482  
<212> PRT  
<213> Unknown

<220>  
<223> Unknown source

<400> 9

Ala Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Asp Leu Pro  
1 5 10 15

Asn Asp Gly Thr Leu Trp Thr Lys Val Lys Asn Glu Ala Thr Asn Leu  
20 25 30

Ser Ser Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr Lys Gly  
35 40 45

Thr Ser Gln Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr Asp Leu  
50 55 60

Gly Glu Phe Asn Gln Lys Gly Thr Ile Arg Thr Lys Tyr Gly Thr Lys  
65 70 75 80

Ala Gln Tyr Ile Gln Ala Ile Gln Ala Ala Lys Ala Ala Gly Met Gln  
85 90 95

Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala Asp Gly Thr  
100 105 110

Glu Phe Val Asp Ala Val Glu Val Asn Pro Ser Asn Arg Asn Gln Glu  
115 120 125

Thr Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe Asp Phe Pro  
130 135 140

Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp Tyr His Phe  
145 150 155 160

Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys  
165 170 175

Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp Thr Glu Asn  
180 185 190

Gly Asn Tyr Asp Tyr Leu Met Phe Ala Asp Leu Asp Met Asp His Pro  
195 200 205

Glu Val Val Thr Glu Leu Lys Asn Trp Gly Lys Trp Tyr Val Asn Thr  
210 215 220

Thr Asn Val Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Tyr  
225 230 235 240

Ser Phe Phe Pro Asp Trp Leu Thr Tyr Val Arg Asn Gln Thr Gly Lys  
245 250 255

Asn Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Val Asn Lys Leu  
260 265 270

His Asn Tyr Ile Thr Lys Thr Asn Gly Ser Met Ser Leu Phe Asp Ala  
275 280 285

Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Ser Gly Tyr Phe  
290 295 300

Asp Met Arg Tyr Leu Leu Asn Asn Thr Leu Met Lys Asp Gln Pro Ser  
305 310 315 320

Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser  
325 330 335

Leu Gln Ser Trp Val Glu Ala Trp Phe Lys Pro Leu Ala Tyr Ala Phe  
340 345 350

Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr Gly Asp Tyr  
355 360 365

Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Gly Leu Lys Ser Lys Ile Asp  
370 375 380

Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln Arg Asp  
385 390 395 400



Tyr Ile Asp His Gln Asp Ile Ile Gly Trp Thr Arg Glu Gly Ile Asp  
405 410 415

Ala Lys Pro Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly  
420 425 430

Gly Ser Lys Trp Met Tyr Val Gly Lys Lys His Ala Gly Lys Val Phe  
435 440 445

Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn Ala Asp  
450 455 460

Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Ile Trp Val  
465 470 475 480

Ala Lys

<210> 10  
<211> 482  
<212> PRT  
<213> Unknown

<220>  
<223> Source unknown

<400> 10

Ala Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Asp Leu Pro  
1 5 10 15

Asn Asp Gly Thr Leu Trp Thr Lys Val Lys Asn Glu Ala Thr Asn Leu  
20 25 30

Ser Ser Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr Lys Gly  
35 40 45

Thr Ser Gln Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr Asp Leu  
50 55 60

Gly Glu Phe Asn Gln Lys Gly Thr Ile Arg Thr Lys Tyr Gly Thr Lys  
65 70 75 80

Thr Gln Tyr Ile Gln Ala Ile Gln Thr Ala Gln Ala Ala Gly Met Gln  
85 90 95

Val	Tyr	Ala	Asp	Val	Val	Phe	Asn	His	Lys	Ala	Gly	Ala	Asp	Ser	Thr	100	105	110	
Glu	Phe	Val	Asp	Ala	Val	Glu	Val	Asn	Pro	Ser	Asn	Arg	Asn	Gln	Glu	115	120	125	
Thr	Ser	Gly	Thr	Tyr	Gln	Ile	Gln	Ala	Trp	Thr	Lys	Phe	Asp	Phe	Pro	130	135	140	
Gly	Arg	Gly	Asn	Thr	Tyr	Ser	Ser	Phe	Lys	Trp	Arg	Trp	Tyr	His	Phe	145	150	155	160
Asp	Gly	Thr	Asp	Trp	Asp	Glu	Ser	Arg	Lys	Leu	Asn	Arg	Ile	Tyr	Lys	165	170	175	
Phe	Arg	Gly	Thr	Gly	Lys	Ala	Trp	Asp	Trp	Glu	Val	Asp	Thr	Glu	Asn	180	185	190	
Gly	Asn	Tyr	Asp	Tyr	Leu	Met	Phe	Ala	Asp	Leu	Asp	Met	Asp	His	Pro	195	200	205	
Glu	Val	Val	Thr	Glu	Leu	Lys	Asn	Trp	Gly	Thr	Trp	Tyr	Val	Asn	Thr	210	215	220	
Thr	Asn	Ile	Asp	Gly	Phe	Arg	Leu	Asp	Ala	Val	Lys	His	Ile	Lys	Tyr	225	230	235	240
Ser	Phe	Phe	Pro	Asp	Trp	Leu	Thr	Tyr	Val	Arg	Asn	Gln	Thr	Gly	Lys	245	250	255	
Asn	Leu	Phe	Ala	Val	Gly	Glu	Phe	Trp	Ser	Tyr	Asp	Val	Asn	Lys	Leu	260	265	270	
His	Asn	Tyr	Ile	Thr	Lys	Thr	Asn	Gly	Ser	Met	Ser	Leu	Phe	Asp	Ala	275	280	285	
Pro	Leu	His	Asn	Asn	Phe	Tyr	Thr	Ala	Ser	Lys	Ser	Ser	Gly	Tyr	Phe	290	295	300	
Asp	Met	Arg	Tyr	Leu	Leu	Asn	Asn	Thr	Leu	Met	Lys	Asp	Gln	Pro	Ser	305	310	315	320

Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser  
 325 330 335

Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Gln Leu Ala Tyr Ala Phe  
 340 345 350

Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr Gly Asp Tyr  
 355 360 365

Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Gly Leu Lys Ser Lys Ile Asp  
 370 375 380

Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln Arg Asp  
 385 390 395 400

Tyr Ile Asp His Gln Asp Ile Ile Gly Trp Thr Arg Glu Gly Ile Asp  
 405 410 415

Ala Lys Pro Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly  
 420 425 430

Gly Ser Lys Trp Met Tyr Val Gly Lys Lys His Ala Gly Lys Val Phe  
 435 440 445

Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn Ala Asp  
 450 455 460

Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Ile Trp Val  
 465 470 475 480

Ala Lys

<210> 11  
 <211> 482  
 <212> PRT  
 <213> Unknown

<220>  
 <223> Source unknown

<400> 11

Ala Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Asp Leu Pro  
 1 5 10 15

Asn Asp Gly Thr Leu Trp Thr Lys Val Lys Asn Glu Ala Ser Ser Leu  
 20 25 30

Ser Ser Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr Lys Gly  
 35 40 45

Thr Ser Gln Gly Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr Asp Leu  
 50 55 60

Gly Glu Phe Asn Gln Lys Gly Thr Ile Arg Thr Lys Tyr Gly Thr Lys  
 65 70 75 80

Thr Gln Tyr Leu Gln Ala Ile Gln Ala Ala Lys Ser Ala Gly Met Gln  
 85 90 95

Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala Asp Ser Thr  
 100 105 110

Glu Trp Val Asp Ala Val Glu Val Asn Pro Ser Asn Arg Asn Gln Glu  
 115 120 125

Thr Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe Asp Phe Pro  
 130 135 140

Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp Tyr His Phe  
 145 150 155 160

Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys  
 165 170 175

Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp Thr Glu Asn  
 180 185 190

Gly Asn Tyr Asp Tyr Leu Met Phe Ala Asp Leu Asp Met Asp His Pro  
 195 200 205

Glu Val Val Thr Glu Leu Lys Asn Trp Gly Thr Trp Tyr Val Asn Thr  
 210 215 220

Thr Asn Val Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Tyr  
 225 230 235 240

Ser Phe Phe Pro Asp Trp Leu Thr His Val Arg Ser Gln Thr Arg Lys  
 245 250 255

Asn Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Val Asn Lys Leu  
 260 265 270

His Asn Tyr Ile Thr Lys Thr Ser Gly Thr Met Ser Leu Phe Asp Ala  
 275 280 285

Pro Leu His Asn Asn Phe Tyr Thr Ala Ser Lys Ser Ser Gly Tyr Phe  
 290 295 300

Asp Met Arg Tyr Leu Leu Asn Asn Thr Leu Met Lys Asp Gln Pro Ser  
 305 310 315 320

Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser  
 325 330 335

Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala Tyr Ala Phe  
 340 345 350

Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr Gly Asp Tyr  
 355 360 365

Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Gly Leu Lys Ser Lys Ile Asp  
 370 375 380

Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln Arg Asp  
 385 390 395 400

Tyr Ile Asp His Gln Asp Ile Ile Gly Trp Thr Arg Glu Gly Ile Asp  
 405 410 415

Ser Lys Pro Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly  
 420 425 430

Gly Ser Lys Trp Met Tyr Val Gly Lys Lys His Ala Gly Lys Val Phe  
 435 440 445

Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn Ala Asp  
 450 455 460

Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Ile Trp Val

465                                      470                                      475                                      480

Ala Lys

<210> 12  
 <211> 482  
 <212> PRT  
 <213> Unknown

<220>  
 <223> Source unknown

<400> 12

Ala Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Asp Leu Pro  
 1                                      5                                      10                                      15

Asn Asp Gly Thr Leu Trp Thr Lys Val Lys Asn Glu Ala Ser Ser Leu  
                                     20                                      25                                      30

Ser Ser Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr Lys Gly  
                                     35                                      40                                      45

Thr Ser Gln Gly Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr Asp Leu  
                                     50                                      55                                      60

Gly Glu Phe Asn Gln Lys Gly Thr Ile Arg Thr Lys Tyr Gly Thr Lys  
 65                                      70                                      75                                      80

Thr Gln Tyr Leu Gln Ala Ile Gln Ala Ala Lys Ser Ala Gly Met Gln  
                                     85                                      90                                      95

Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala Asp Ser Thr  
                                     100                                      105                                      110

Glu Trp Val Asp Ala Val Glu Val Asn Pro Ser Asn Arg Asn Gln Glu  
                                     115                                      120                                      125

Thr Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe Asp Phe Pro  
                                     130                                      135                                      140

Asp Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp Tyr His Phe  
 145                                      150                                      155                                      160

Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys  
165 170 175

Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp Thr Glu Asn  
180 185 190

Gly Asn Tyr Asp Tyr Leu Met Phe Ala Asp Leu Asp Met Asp His Pro  
195 200 205

Glu Val Val Thr Glu Leu Lys Asn Trp Gly Thr Trp Tyr Val Asn Thr  
210 215 220

Thr Asn Val Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Tyr  
225 230 235 240

Ser Phe Phe Pro Asp Trp Leu Thr Tyr Val Arg Ser Gln Thr Gln Lys  
245 250 255

Asn Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Val Asn Lys Leu  
260 265 270

His Asn Tyr Ile Thr Lys Thr Ser Gly Thr Met Ser Leu Phe Asp Ala  
275 280 285

Pro Leu His Asn Asn Phe Tyr Thr Ala Ser Lys Ser Ser Gly Tyr Phe  
290 295 300

Asp Met Arg Tyr Leu Leu Asn Asn Thr Leu Met Lys Asp Gln Pro Ser  
305 310 315 320

Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser  
325 330 335

Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala Tyr Ala Phe  
340 345 350

Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr Gly Asp Tyr  
355 360 365

Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Gly Leu Lys Ser Lys Ile Asp  
370 375 380

Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln Arg Asp

385                      390                      395                      400

Tyr Ile Asp His Gln Asp Ile Ile Gly Trp Thr Arg Glu Gly Ile Asp  
                                 405                      410                      415

Ser Lys Pro Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly  
                                 420                      425                      430

Gly Ser Lys Trp Met Tyr Val Gly Lys Lys His Ala Gly Lys Val Phe  
                                 435                      440                      445

Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn Ala Asp  
                                 450                      455                      460

Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Ile Trp Val  
465                      470                      475                      480

Ala Lys

<210> 13  
<211> 483  
<212> PRT  
<213> Bacillus licheniformis

<400> 13

Ala Asn Leu Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Met Pro  
1                      5                      10                      15

Asn Asp Gly Gln His Trp Arg Arg Leu Gln Asn Asp Ser Ala Tyr Leu  
20                      25                      30

Ala Glu His Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly  
35                      40                      45

Thr Ser Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu  
50                      55                      60

Gly Glu Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys  
65                      70                      75                      80

Gly Glu Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn  
85                      90                      95



Val Tyr Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr  
 100 105 110

Glu Asp Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val  
 115 120 125

Ile Ser Gly Glu His Leu Ile Lys Ala Trp Thr His Phe His Phe Pro  
 130 135 140

Gly Arg Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe  
 145 150 155 160

Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys  
 165 170 175

Phe Gln Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn  
 180 185 190

Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val  
 195 200 205

Ala Ala Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln  
 210 215 220

Leu Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe  
 225 230 235 240

Leu Arg Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met  
 245 250 255

Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn  
 260 265 270

Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu  
 275 280 285

His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Gly Tyr Asp Met  
 290 295 300

Arg Lys Leu Leu Asn Gly Thr Val Val Ser Lys His Pro Leu Lys Ser  
 305 310 315 320

Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu  
325 330 335

Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu  
340 345 350

Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly  
355 360 365

Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile  
370 375 380

Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His  
385 390 395 400

Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp  
405 410 415

Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro  
420 425 430

Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr  
435 440 445

Trp His Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser  
450 455 460

Glu Gly Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr  
465 470 475 480

Val Gln Arg

<210> 14

<211> 483

<212> PRT

<213> Bacillus amyloliquefacience

<400> 14

Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp  
1 5 10 15

Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp  
20 25 30

Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser  
 35 40 45

Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu  
 50 55 60

Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu  
 65 70 75 80

Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr  
 85 90 95

Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp  
 100 105 110

Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser  
 115 120 125

Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg  
 130 135 140

Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly  
 145 150 155 160

Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg  
 165 170 175

Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn  
 180 185 190

Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val  
 195 200 205

Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser  
 210 215 220

Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe  
 225 230 235 240

Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met  
 245 250 255

Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn  
260 265 270

Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu  
275 280 285

His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Gly Tyr Asp Met  
290 295 300

Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala  
305 310 315 320

Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu  
325 330 335

Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu  
340 345 350

Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly  
355 360 365

Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile  
370 375 380

Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His  
385 390 395 400

Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp  
405 410 415

Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro  
420 425 430

Gly Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr  
435 440 445

Trp Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser  
450 455 460

Asp Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr  
465 470 475 480

Val Gln Lys

<210> 15  
<211> 483  
<212> PRT  
<213> Bacillus stearothermophilus

<400> 15

Ala Ala Pro Phe Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Tyr Leu  
1 5 10 15

Pro Asp Asp Gly Thr Leu Trp Thr Lys Val Ala Asn Glu Ala Asn Asn  
20 25 30

Leu Ser Ser Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr Lys  
35 40 45

Gly Thr Ser Arg Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr Asp  
50 55 60

Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr  
65 70 75 80

Lys Ala Gln Tyr Leu Gln Ala Ile Gln Ala Ala His Ala Ala Gly Met  
85 90 95

Gln Val Tyr Ala Asp Val Val Phe Asp His Lys Gly Gly Ala Asp Gly  
100 105 110

Thr Glu Trp Val Asp Ala Val Glu Val Asn Pro Ser Asp Arg Asn Gln  
115 120 125

Glu Ile Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe Asp Phe  
130 135 140

Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp Tyr His  
145 150 155 160

Phe Asp Gly Val Asp Trp Asp Glu Ser Arg Lys Leu Ser Arg Ile Tyr  
165 170 175

Lys Phe Arg Gly Ile Gly Lys Ala Trp Asp Trp Glu Val Asp Thr Glu  
180 185 190

Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Leu Asp Met Asp His  
 195 200 205

Pro Glu Val Val Thr Glu Leu Lys Asn Trp Gly Lys Trp Tyr Val Asn  
 210 215 220

Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys  
 225 230 235 240

Phe Ser Phe Phe Pro Asp Trp Leu Ser Tyr Val Arg Ser Gln Thr Gly  
 245 250 255

Lys Pro Leu Phe Thr Val Gly Glu Tyr Trp Ser Tyr Asp Ile Asn Lys  
 260 265 270

Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Thr Met Ser Leu Phe Asp  
 275 280 285

Ala Pro Leu His Asn Lys Phe Tyr Thr Ala Ser Lys Ser Gly Gly Ala  
 290 295 300

Phe Asp Met Arg Thr Leu Met Thr Asn Thr Leu Met Lys Asp Gln Pro  
 305 310 315 320

Thr Leu Ala Val Thr Phe Val Asp Asn His Asp Thr Glu Pro Gly Gln  
 325 330 335

Ala Leu Gln Ser Trp Val Asp Pro Trp Phe Lys Pro Leu Ala Tyr Ala  
 340 345 350

Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr Gly Asp  
 355 360 365

Tyr Tyr Gly Ile Pro Gln Tyr Asn Ile Pro Ser Leu Lys Ser Lys Ile  
 370 375 380

Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln His  
 385 390 395 400

Asp Tyr Leu Asp His Ser Asp Ile Ile Gly Trp Thr Arg Glu Gly Val  
 405 410 415

Thr Glu Lys Pro Gly Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro  
 420 425 430

Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Gln His Ala Gly Lys Val  
 435 440 445

Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn Ser  
 450 455 460

Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Val Trp  
 465 470 475 480

Val Pro Arg

<210> 16  
 <211> 485  
 <212> PRT  
 <213> Unknown

<220>  
 <223> Source unknown

<400> 16

His His Asn Gly Thr Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Tyr  
 1 5 10 15

Leu Pro Asn Asp Gly Asn His Trp Asn Arg Leu Arg Ser Asp Ala Ser  
 20 25 30

Asn Leu Lys Asp Lys Gly Ile Ser Ala Val Trp Ile Pro Pro Ala Trp  
 35 40 45

Lys Gly Ala Ser Gln Asn Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr  
 50 55 60

Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Ile Arg Thr Lys Tyr Gly  
 65 70 75 80

Thr Arg Asn Gln Leu Gln Ala Ala Val Asn Ala Leu Lys Ser Asn Gly  
 85 90 95

Ile Gln Val Tyr Gly Asp Val Val Met Asn His Lys Gly Gly Ala Asp  
 100 105 110

Ala Thr Glu Met Val Arg Ala Val Glu Val Asn Pro Asn Asn Arg Asn  
 115 120 125

Gln Glu Val Ser Gly Glu Tyr Thr Ile Glu Ala Trp Thr Lys Phe Asp  
 130 135 140

Phe Pro Gly Arg Gly Asn Thr His Ser Asn Phe Lys Trp Arg Trp Tyr  
 145 150 155 160

His Phe Asp Gly Val Asp Trp Asp Gln Ser Arg Lys Leu Asn Asn Arg  
 165 170 175

Ile Tyr Lys Phe Arg Gly Asp Gly Lys Gly Trp Asp Trp Glu Val Asp  
 180 185 190

Thr Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Met  
 195 200 205

Asp His Pro Glu Val Val Asn Glu Leu Arg Asn Trp Gly Val Trp Tyr  
 210 215 220

Thr Asn Thr Leu Gly Leu Asp Gly Phe Arg Ile Asp Ala Val Lys His  
 225 230 235 240

Ile Lys Tyr Ser Phe Thr Arg Asp Trp Ile Asn His Val Arg Ser Ala  
 245 250 255

Thr Gly Lys Asn Met Phe Ala Val Ala Glu Phe Trp Lys Asn Asp Leu  
 260 265 270

Gly Ala Ile Glu Asn Tyr Leu Asn Lys Thr Asn Trp Asn His Ser Val  
 275 280 285

Phe Asp Val Pro Leu His Tyr Asn Leu Tyr Asn Ala Ser Lys Ser Gly  
 290 295 300

Gly Asn Tyr Asp Met Arg Gln Ile Phe Asn Gly Thr Val Val Gln Arg  
 305 310 315 320

His Pro Met His Ala Val Thr Phe Val Asp Asn His Asp Ser Gln Pro  
 325 330 335



Glu Glu Ala Leu Glu Ser Phe Val Glu Glu Trp Phe Lys Pro Leu Ala  
 340 345 350

Tyr Ala Leu Thr Leu Thr Arg Glu Gln Gly Tyr Pro Ser Val Phe Tyr  
 355 360 365

Gly Asp Tyr Tyr Gly Ile Pro Thr His Gly Val Pro Ala Met Lys Ser  
 370 375 380

Lys Ile Asp Pro Ile Leu Glu Ala Arg Gln Lys Tyr Ala Tyr Gly Arg  
 385 390 395 400

Gln Asn Asp Tyr Leu Asp His His Asn Ile Ile Gly Trp Thr Arg Glu  
 405 410 415

Gly Asn Thr Ala His Pro Asn Ser Gly Leu Ala Thr Ile Met Ser Asp  
 420 425 430

Gly Ala Gly Gly Asn Lys Trp Met Phe Val Gly Arg Asn Lys Ala Gly  
 435 440 445

Gln Val Trp Thr Asp Ile Thr Gly Asn Arg Ala Gly Thr Val Thr Ile  
 450 455 460

Asn Ala Asp Gly Trp Gly Asn Phe Ser Val Asn Gly Gly Ser Val Ser  
 465 470 475 480

Ile Trp Val Asn Lys  
 485

<210> 17  
 <211> 484  
 <212> PRT  
 <213> Unknown

<220>  
 <223> Source unknown

<400> 17

Gly Ser Val Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Tyr  
 1 5 10 15

Leu Pro Asp Asp Gly Thr Leu Trp Thr Lys Val Ala Asn Asn Ala Gln  
 20 25 30

Ser Leu Ala Asn Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr  
 35 40 45

Lys Gly Thr Ser Ser Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr  
 50 55 60

Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly  
 65 70 75 80

Thr Lys Thr Gln Tyr Ile Gln Ala Ile Gln Ala Ala His Thr Ala Gly  
 85 90 95

Met Gln Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala Asp  
 100 105 110

Gly Thr Glu Leu Val Asp Ala Val Glu Val Asn Pro Ser Asp Arg Asn  
 115 120 125

Gln Glu Ile Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe Asp  
 130 135 140

Phe Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp Tyr  
 145 150 155 160

His Phe Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile  
 165 170 175

Tyr Lys Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp Thr  
 180 185 190

Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Leu Asp Met Asp  
 195 200 205

His Pro Glu Val Val Ser Glu Leu Lys Asn Trp Gly Lys Trp Tyr Val  
 210 215 220

Thr Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile  
 225 230 235 240

Lys Tyr Ser Phe Phe Pro Asp Trp Leu Ser Tyr Val Arg Thr Gln Thr  
 245 250 255

Gln Lys Pro Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Ile Asn  
 260 265 270

Lys Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Ser Met Ser Leu Phe  
 275 280 285

Asp Ala Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Gly Gly  
 290 295 300

Tyr Phe Asp Met Arg Thr Leu Leu Asn Asn Thr Leu Met Lys Asp Gln  
 305 310 315 320

Pro Thr Leu Ser Val Thr Leu Val Asp Asn His Asp Thr Glu Pro Gly  
 325 330 335

Gln Ser Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala Tyr  
 340 345 350

Ala Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Ile Phe Tyr Gly  
 355 360 365

Asp Tyr Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Ala Leu Lys Ser Lys  
 370 375 380

Leu Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln  
 385 390 395 400

His Asp Tyr Ile Asp Asn Ala Asp Ile Ile Gly Trp Thr Arg Glu Gly  
 405 410 415

Val Ala Glu Lys Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly  
 420 425 430

Pro Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Gln His Ala Gly Lys  
 435 440 445

Thr Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn  
 450 455 460

Ala Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Ile  
 465 470 475 480

Trp Val Pro Lys

<210> 18  
<211> 485  
<212> PRT  
<213> Unknown

<220>  
<223> Source unknown

<400> 18

Ala Asn Thr Ala Pro Ile Asn Glu Thr Met Met Gln Tyr Phe Glu Trp  
1 5 10 15

Asp Leu Pro Asn Asp Gly Thr Leu Trp Thr Lys Val Lys Asn Glu Ala  
20 25 30

Ala Asn Leu Ser Ser Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala  
35 40 45

Tyr Lys Gly Thr Ser Gln Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu  
50 55 60

Tyr Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Ile Arg Thr Lys Tyr  
65 70 75 80

Gly Thr Lys Thr Gln Tyr Ile Gln Ala Ile Gln Ala Ala Lys Ala Ala  
85 90 95

Gly Met Gln Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala  
100 105 110

Asp Gly Thr Glu Phe Val Asp Ala Val Glu Val Asp Pro Ser Asn Arg  
115 120 125

Asn Gln Glu Thr Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe  
130 135 140

Asp Phe Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp  
145 150 155 160

Tyr His Phe Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg  
165 170 175

Ile Tyr Lys Phe Arg Ser Thr Gly Lys Ala Trp Asp Trp Glu Val Asp  
 180 185 190

Thr Glu Asn Gly Asn Tyr Asp Tyr Leu Met Phe Ala Asp Leu Asp Met  
 195 200 205

Asp His Pro Glu Val Val Thr Glu Leu Lys Asn Trp Gly Thr Trp Tyr  
 210 215 220

Val Asn Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His  
 225 230 235 240

Ile Lys Tyr Ser Phe Phe Pro Asp Trp Leu Thr Tyr Val Arg Asn Gln  
 245 250 255

Thr Gly Lys Asn Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Val  
 260 265 270

Asn Lys Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Ser Met Ser Leu  
 275 280 285

Phe Asp Ala Pro Leu His Asn Asn Phe Tyr Thr Ala Ser Lys Ser Ser  
 290 295 300

Gly Tyr Phe Asp Met Arg Tyr Leu Leu Asn Asn Thr Leu Met Lys Asp  
 305 310 315 320

Gln Pro Ser Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Gln Pro  
 325 330 335

Gly Gln Ser Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala  
 340 345 350

Tyr Ala Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr  
 355 360 365

Gly Asp Tyr Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Gly Leu Lys Ser  
 370 375 380

Lys Ile Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr  
 385 390 395 400

Gln Arg Asp Tyr Ile Asp His Gln Asp Ile Ile Gly Trp Thr Arg Glu  
 405 410 415

Gly Ile Asp Thr Lys Pro Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp  
 420 425 430

Gly Pro Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Lys His Ala Gly  
 435 440 445

Lys Val Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile  
 450 455 460

Asn Ala Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser  
 465 470 475 480

Ile Trp Val Ala Lys  
 485

<210> 19  
 <211> 619  
 <212> PRT  
 <213> Bacillus flavothermus

<400> 19

Met Ser Leu Phe Lys Lys Ser Phe Pro Trp Ile Leu Ser Leu Leu Leu  
 1 5 10 15

Leu Phe Ser Phe Ile Ala Pro Phe Ser Ile Gln Thr Glu Lys Val Arg  
 20 25 30

Ala Gly Ser Val Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp  
 35 40 45

Tyr Leu Pro Asp Asp Gly Thr Leu Trp Thr Lys Val Ala Asn Asn Ala  
 50 55 60

Gln Ser Leu Ala Asn Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala  
 65 70 75 80

Tyr Lys Gly Thr Ser Ser Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu  
 85 90 95

Tyr Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr  
 100 105 110

Gly Thr Lys Thr Gln Tyr Ile Gln Ala Ile Gln Ala Ala His Thr Ala  
115 120 125

Gly Met Gln Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala  
130 135 140

Asp Gly Thr Glu Leu Val Asp Ala Val Glu Val Asn Pro Ser Asp Arg  
145 150 155 160

Asn Gln Glu Ile Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe  
165 170 175

Asp Phe Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp  
180 185 190

Tyr His Phe Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg  
195 200 205

Ile Tyr Lys Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp  
210 215 220

Thr Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Leu Asp Met  
225 230 235 240

Asp His Pro Glu Val Val Ser Glu Leu Lys Asn Trp Gly Lys Trp Tyr  
245 250 255

Val Thr Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His  
260 265 270

Ile Lys Tyr Ser Phe Phe Pro Asp Trp Leu Ser Tyr Val Arg Thr Gln  
275 280 285

Thr Gln Lys Pro Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Ile  
290 295 300

Ser Lys Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Ser Met Ser Leu  
305 310 315 320

Phe Asp Ala Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Gly  
325 330 335

Gly Tyr Phe Asp Met Arg Thr Leu Leu Asn Asn Thr Leu Met Lys Asp  
 340 345 350

Gln Pro Thr Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Glu Pro  
 355 360 365

Gly Gln Ser Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala  
 370 375 380

Tyr Ala Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr  
 385 390 395 400

Gly Asp Tyr Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Ala Leu Lys Ser  
 405 410 415

Lys Leu Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr  
 420 425 430

Gln His Asp Tyr Ile Asp Ser Ala Asp Ile Ile Gly Trp Thr Arg Glu  
 435 440 445

Gly Val Ala Glu Lys Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp  
 450 455 460

Gly Pro Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Gln His Ala Gly  
 465 470 475 480

Lys Thr Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile  
 485 490 495

Asn Ala Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser  
 500 505 510

Ile Trp Val Pro Lys Ile Ser Thr Thr Ser Gln Ile Thr Phe Thr Val  
 515 520 525

Asn Asn Ala Thr Thr Val Trp Gly Gln Asn Val Tyr Val Val Gly Asn  
 530 535 540

Ile Ser Gln Leu Gly Asn Trp Asp Pro Val His Ala Val Gln Met Thr  
 545 550 555 560



Pro Ser Ser Tyr Pro Thr Trp Thr Val Thr Ile Pro Leu Leu Gln Gly  
565 570 575

Gln Asn Ile Gln Phe Lys Phe Ile Lys Lys Asp Ser Ala Gly Asn Val  
580 585 590

Ile Trp Glu Asp Ile Ser Asn Arg Thr Tyr Thr Val Pro Thr Ala Ala  
595 600 605

Ser Gly Ala Tyr Thr Ala Ser Trp Asn Val Pro  
610 615

<210> 20  
<211> 613  
<212> PRT  
<213> Bacillus

<400> 20

Met Ser Tyr Leu Lys Lys Val Trp Leu Tyr Tyr Thr Ile Ile Ala Thr  
1 5 10 15

Leu Ile Ile Ser Phe Phe Thr Pro Phe Ser Thr Ala Gln Ala Asn Thr  
20 25 30

Ala Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp Asp Leu Pro  
35 40 45

Asn Asp Gly Thr Leu Trp Thr Lys Val Lys Asn Glu Ala Ser Ser Leu  
50 55 60

Ser Ala Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala Tyr Lys Gly  
65 70 75 80

Thr Ser Gln Ala Asp Val Gly Tyr Gly Val Tyr Asp Leu Tyr Asp Leu  
85 90 95

Gly Glu Phe Asn Gln Lys Gly Thr Ile Arg Thr Lys Tyr Gly Thr Lys  
100 105 110

Thr Gln Tyr Leu Gln Ala Ile Gln Ala Ala Lys Ser Ala Gly Met Gln  
115 120 125

Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala Asp Ser Thr  
130 135 140

Glu Trp Val Asp Ala Val Glu Val Asn Pro Ser Asn Arg Asn Gln Glu  
 145 150 155 160

Thr Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe Asp Phe Pro  
 165 170 175

Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp Tyr His Phe  
 180 185 190

Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys  
 195 200 205

Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp Thr Glu Asn  
 210 215 220

Gly Asn Tyr Asp Tyr Leu Met Phe Ala Asp Leu Asp Met Asp His Pro  
 225 230 235 240

Glu Val Val Ala Glu Leu Lys Asn Trp Gly Lys Trp Tyr Val Asn Thr  
 245 250 255

Thr Asn Val Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Tyr  
 260 265 270

Ser Phe Phe Pro Asp Trp Leu Ser Tyr Val Arg Asn Gln Thr Gly Lys  
 275 280 285

Asn Leu Phe Ala Val Gly Glu Phe Trp Gly Tyr Asp Val Asn Lys Leu  
 290 295 300

His Asn Tyr Ile Thr Lys Thr Asn Gly Ala Met Ser Leu Phe Asp Ala  
 305 310 315 320

Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Ser Gly Tyr Phe  
 325 330 335

Asp Met Arg Tyr Leu Leu Asn Asn Thr Leu Met Lys Asp Gln Pro Ala  
 340 345 350

Leu Ala Val Thr Leu Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser  
 355 360 365

Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala Tyr Ala Phe  
 370 375 380

Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr Gly Asp Tyr  
 385 390 395 400

Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Gly Leu Lys Ser Lys Ile Asp  
 405 410 415

Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr Gln Arg Asp  
 420 425 430

Tyr Ile Asp His Gln Asp Ile Ile Gly Trp Thr Arg Glu Gly Ile Asp  
 435 440 445

Ala Lys Pro Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly  
 450 455 460

Gly Ser Lys Trp Met Tyr Val Gly Lys Arg His Ala Gly Lys Val Phe  
 465 470 475 480

Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile Asn Ala Asp  
 485 490 495

Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser Ile Trp Val  
 500 505 510

Ala Lys Thr Ser Asn Val Thr Phe Thr Val Asn Asn Ala Thr Thr Val  
 515 520 525

Tyr Gly Gln Asn Val Tyr Val Val Gly Asn Ile Pro Glu Leu Gly Asn  
 530 535 540

Trp Asn Ile Ala Asn Ala Ile Gln Met Thr Pro Ser Ser Tyr Pro Thr  
 545 550 555 560

Trp Lys Thr Thr Val Ser Leu Pro Gln Gly Lys Ala Ile Glu Phe Lys  
 565 570 575

Phe Ile Lys Lys Asp Ser Ala Gly Asn Val Ile Trp Glu Asn Ile Ala  
 580 585 590

Asn Arg Thr Tyr Thr Val Pro Phe Ser Ser Thr Gly Ser Tyr Thr Ala  
 595 600 605

Asn Trp Asn Val Pro  
 610

<210> 21  
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<400> 21

Met Ser Leu Phe Lys Lys Ile Phe Pro Trp Ile Leu Ser Leu Leu Leu  
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Leu Phe Ser Phe Ile Ala Pro Phe Ser Ile Gln Thr Glu Lys Val Arg  
 20 25 30

Ala Gly Ser Val Pro Val Asn Gly Thr Met Met Gln Tyr Phe Glu Trp  
 35 40 45

Tyr Leu Pro Asp Asp Gly Thr Leu Trp Thr Lys Val Ala Asn Asn Ala  
 50 55 60

Gln Ser Leu Ala Asn Leu Gly Ile Thr Ala Leu Trp Leu Pro Pro Ala  
 65 70 75 80

Tyr Lys Gly Thr Ser Ser Ser Asp Val Gly Tyr Gly Val Tyr Asp Leu  
 85 90 95

Tyr Asp Leu Gly Glu Phe Asn Gln Lys Gly Thr Val Arg Thr Lys Tyr  
 100 105 110

Gly Thr Lys Thr Gln Tyr Ile Gln Ala Ile Gln Ala Ala His Thr Ala  
 115 120 125

Gly Met Gln Val Tyr Ala Asp Val Val Phe Asn His Lys Ala Gly Ala  
 130 135 140

Asp Gly Thr Glu Leu Val Asp Ala Val Glu Val Asn Pro Ser Asp Arg  
 145 150 155 160

Asn Gln Glu Ile Ser Gly Thr Tyr Gln Ile Gln Ala Trp Thr Lys Phe  
 165 170 175

Asp Phe Pro Gly Arg Gly Asn Thr Tyr Ser Ser Phe Lys Trp Arg Trp  
180 185 190

Tyr His Phe Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg  
195 200 205

Ile Tyr Lys Phe Arg Gly Thr Gly Lys Ala Trp Asp Trp Glu Val Asp  
210 215 220

Thr Glu Asn Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Leu Asp Met  
225 230 235 240

Asp His Pro Glu Val Val Ser Glu Leu Lys Asn Trp Gly Lys Trp Tyr  
245 250 255

Val Ile Thr Thr Asn Ile Asp Gly Phe Arg Leu Asp Ala Val Lys His  
260 265 270

Ile Lys Tyr Ser Phe Phe Pro Asp Trp Leu Ser Tyr Leu Arg Thr Gln  
275 280 285

Thr Gln Lys Pro Leu Phe Ala Val Gly Glu Phe Trp Ser Tyr Asp Ile  
290 295 300

Asn Lys Leu His Asn Tyr Ile Thr Lys Thr Asn Gly Ser Met Ser Leu  
305 310 315 320

Phe Asp Ala Pro Leu His Asn Asn Phe Tyr Ile Ala Ser Lys Ser Gly  
325 330 335

Gly Tyr Phe Asp Met Arg Thr Leu Leu Asn Asn Thr Leu Met Lys Glu  
340 345 350

Gln Pro Thr Leu Ser Val Thr Leu Val Asp Asn His Asp Thr Glu Pro  
355 360 365

Gly Gln Ser Leu Gln Ser Trp Val Glu Pro Trp Phe Lys Pro Leu Ala  
370 375 380

Tyr Ala Phe Ile Leu Thr Arg Gln Glu Gly Tyr Pro Cys Val Phe Tyr  
385 390 395 400

Gly Asp Tyr Tyr Gly Ile Pro Lys Tyr Asn Ile Pro Ala Leu Lys Ser  
 405 410 415

Lys Leu Asp Pro Leu Leu Ile Ala Arg Arg Asp Tyr Ala Tyr Gly Thr  
 420 425 430

Gln His Asp Tyr Ile Asp Asn Ala Asp Ile Ile Gly Trp Thr Arg Glu  
 435 440 445

Gly Val Ala Glu Lys Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp  
 450 455 460

Gly Pro Gly Gly Ser Lys Trp Met Tyr Val Gly Lys Gln His Ala Gly  
 465 470 475 480

Lys Thr Phe Tyr Asp Leu Thr Gly Asn Arg Ser Asp Thr Val Thr Ile  
 485 490 495

Asn Ala Asp Gly Trp Gly Glu Phe Lys Val Asn Gly Gly Ser Val Ser  
 500 505 510

Ile Trp Val Pro Lys Thr Ser Thr Thr Ser Gln Ile Thr Phe Thr Val  
 515 520 525

Asn Asn Ala Thr Thr Val Trp Gly Gln Asn Val Tyr Val Val Gly Asn  
 530 535 540

Ile Ser Gln Leu Gly Asn Trp Asp Pro Val Asn Ala Val Gln Met Thr  
 545 550 555 560

Pro Ser Ser Tyr Pro Thr Trp Val Val Thr Val Pro Leu Pro Gln Ser  
 565 570 575

Gln Asn Ile Gln Phe Lys Phe Ile Lys Lys Asp Gly Ser Gly Asn Val  
 580 585 590

Ile Trp Glu Asn Ile Ser Asn Arg Thr Tyr Thr Val Pro Thr Ala Ala  
 595 600 605

Ser Gly Ala Tyr Thr Ala Asn Trp Asn Val Pro  
 610 615



Tyr Asp Trp Val' Ala Asp Leu Val Ser Asn Tyr Ser Val Asp Gly Leu  
 210 215 220

Arg Ile Asp Ser Val Glu Glu Val Glu Pro Asp Phe Phe Pro Gly Tyr  
 225 230 235 240

Gln Glu Ala Ala Gly Val Tyr Cys Val Gly Glu Val Asp Asn Gly Asn  
 245 250 255

Pro Ala Leu Asp Cys Pro Tyr Gln Lys Tyr Leu Asp Gly Val Leu Asn  
 260 265 270

Tyr Pro Ile Tyr Trp Gln Leu Leu Tyr Ala Phe Glu Ser Ser Ser Gly  
 275 280 285

Ser Ile Ser Asn Leu Tyr Asn Met Ile Lys Ser Val Ala Ser Asp Cys  
 290 295 300

Ser Asp Pro Thr Leu Leu Gly Asn Phe Ile Glu Asn His Asp Asn Pro  
 305 310 315 320

Arg Phe Ala Ser Tyr Thr Ser Asp Tyr Ser Gln Ala Lys Asn Val Leu  
 325 330 335

Ser Tyr Ile Phe Leu Ser Asp Gly Ile Pro Ile Val Tyr Ala Gly Glu  
 340 345 350

Glu Gln His Tyr Ser Gly Gly Asp Val Pro Tyr Asn Arg Glu Ala Thr  
 355 360 365

Trp Leu Ser Gly Tyr Asp Thr Ser Ala Glu Leu Tyr Thr Trp Ile Ala  
 370 375 380

Thr Thr Asn Ala Ile Arg Lys Leu Ala Ile Ser Ala Asp Ser Asp Tyr  
 385 390 395 400

Ile Thr Tyr Lys Asn Asp Pro Ile Tyr Thr Asp Ser Asn Thr Ile Ala  
 405 410 415

Met Arg Lys Gly Thr Ser Gly Ser Gln Ile Ile Thr Val Leu Ser Asn  
 420 425 430



Lys Gly Ser Ser Gly Ser Ser Tyr Thr Leu Thr Leu Ser Gly Ser Gly  
 435 440 445

Tyr Thr Ser Gly Thr Lys Leu Ile Glu Ala Tyr Thr Cys Thr Ser Val  
 450 455 460

Thr Val Asp Ser Asn Gly Asp Ile Pro Val Pro Met Ala Ser Gly Leu  
 465 470 475 480

Pro Arg Val Leu Leu Pro Ala Ser Val Val Asp Ser Ser Ser Leu Cys  
 485 490 495

Gly Gly Ser Gly Asn Thr Thr Thr Thr Thr Ala Ala Thr Ser Thr  
 500 505 510

Ser Lys Ala Thr Thr Ser Ser Ser Ser Ser Ser Ala Ala Ala Thr Thr  
 515 520 525

Ser Ser Ser Cys Thr Ala Thr Ser Thr Thr Leu Pro Ile Thr Phe Glu  
 530 535 540

Glu Leu Val Thr Thr Thr Tyr Gly Glu Glu Val Tyr Leu Ser Gly Ser  
 545 550 555 560

Ile Ser Gln Leu Gly Glu Trp His Thr Ser Asp Ala Val Lys Leu Ser  
 565 570 575

Ala Asp Asp Tyr Thr Ser Ser Asn Pro Glu Trp Ser Val Thr Val Ser  
 580 585 590

Leu Pro Val Gly Thr Thr Phe Glu Tyr Lys Phe Ile Lys Val Asp Glu  
 595 600 605

Gly Gly Ser Val Thr Trp Glu Ser Asp Pro Asn Arg Glu Tyr Thr Val  
 610 615 620

Pro Glu Cys Gly Ser Gly Ser Gly Glu Thr Val Val Asp Thr Trp Arg  
 625 630 635 640